bundles of the appendages existing in the parenchymatous axis, and passing out independently of any closed cylinder. The permanent elements of the circumference of these stems of *Psaronius* are, however, without any analogue in the monocotyledonous stems.

There seems, then, good reason for establishing two groups of ferns, with differences characteristic of their stems, comparable to those which distinguish the stems of monoctyledons from those of dicotyledons. But the caution I have always insisted on in dealing only with vegetative organs is specially required here, for I have discovered, I believe, the fruiting fronds of one species of this group of plants. With the Bath specimens of *Stemmatopteris insignis*, Corda, as well as with those found on the Continent, the fronds of *Pecopteris arborescens* are always associated. It is the only fern found with some of the Bath specimens. It is also to be observed that the bases of the stipes correspond with the size of the leaf scars on the stems. These facts are not absolutely sufficient for the correlation of the fronds with the stem, but they are the best evidence for this that we can expect in fossil botany short of actual organic union. Now the fruit of *Pecopteris arborescens* is so near to that of *Cyathea* that I can find no characters whereby they can be separated. Our classification based on the stems must of course yield to that derived from the organs of fructification, and our group of ferns, instead of being made into a new order, as would be the case by some who publish on fossil botany, must be grouped with a tribe of recent *Polypodiaceæ*.

It may seem that this is a forced and arbitrary grouping together of plants that in some important characters so remarkably differ; and so it is undoubtedly to those who, with rash confidence, generalise on the systematic position of plants from stem structure alone. But what can such objectors say to the practice of placing in close proximity plants that are beyond question nearly related to each other in all essential characters, though some have caudices, while others possess rhizomes; yet these two forms of stems are yet more widely separated from each other than the extinct palæozoic group is from the recent forms.

SCIENTIFIC SERIALS

THE double number (Nos. 5 and 6) of the *Annalen der Chemie und Pharmacie* commences with a paper by Carl Grunzweig, on "Butyric acid from different sources." He prepared the perfectly pure normal and isobutyric acids and their salts, and examined their properties very carefully; he then examined butyric acid as obtained from butter, which he finds to be normal butyric acid, and the acid from the oxidation of conine and that from the carob, or St. John's bread, are also the normal acid.—Von Schneider contributes a long paper upon pollen and wax formation; which is followed by a second contribution by Kachler on the compounds of the camphor group. He has accurately examined into the properties of campholic acid and some of its salts, and also into the action of bromine and phosphoric chloride on that body. The action of bromine is to oxidize the acid, forming oxycamphoric anhydride, hydrobromic acid being produced in quantity. He has also examined camphinic acid.—Weselsky follows, with an important paper on the azocompounds of resorcin, in the theoretical parts of which some most elaborate graphic formulæ are brought to life.—Liebermann and Chojnacki have again examined rufiopin, which was first obtained by Anderson from opianic acid. The authors' researches show that it belongs to the anthracene group, as by the action of zinc powder at a high temperature this hydrocarbon can be obtained from it. It therefore belongs to the same series to which the colouring matters alizarin and purpurin belong, being the next higher body in the series to purpurin.—Dittmar and Kekulé contribute a paper on an aromatic glycollic acid. The starting point for the production of this body is toluylic acid, which is acted on by bromine, and the resulting bromo-compound again acted on by barytic hydrate. The oxymethylphenylformic acid obtained forms small plates or needles as crystallised from water.—Amato has endeavoured to obtain dicyanacetic acid by treating dichloracetic ether with potassic cyanide. He has not succeeded in obtaining the acid, but seems to have produced a body which has resulted from the decomposition of dicyanacetic ether with two molecules of water.—This number contains 18 original papers, several of which, however, are translations from foreign journals.

Annalen der Chemie und Pharmacie, No. 7.—This number commences with a lengthy article on chrysanisic acid, by H. Salkowski. This acid was discovered by Cahours, in the year 1849, and has been experimented on by many chemists. Kekulé has proved that it has the constitution of a dinitrobenzoic acid, of the formula $C_6H_2(NO_2)_2(NH_2)CO_2H$. Dr. Salkowski has now made some experiments on this and its derivatives. Chrysanisic acid is obtained by treating anisol with nitric acid of 1·4 sp. gr., which converts it into nitro-anisic acid; this latter body is then treated with red fuming nitric acid, the product of which action is submitted to the action of ammonia, which yields ammonic chrysanisate. This crystallises easily, and the acid can be obtained from it in the pure state without difficulty. The author has prepared a number of the salts of this acid, which are here described in detail. By the action of hydrochloric acid and tin on chrysanisic acid, triamidobenzoic acid is produced; this acid, on heating, is decomposed into triamidobenzol and carbonic anhydride. Triamidobenzoic acid appears to possess both acid and basic properties, as it can form salts with both strong acids and bases. Both classes of salts have been prepared and are described. Thus triamidobenzoic acid forms a compound with two molecules of hydrochloric acid, and also with one of sulphuric acid. Chrysanisic acid, by the action of strong hydrochloric acid, yields trichlorobenzoic acid; and by the action of nitrous acid, dinitroparoxybenzoic acid is obtained. From this body the monethyl and diethyl derivatives can be prepared.—An interesting paper on the influence of potassium and sodium salts on fermentation, by C. Knapp, follows. He finds that both potassium and sodium salts, more especially the chlorides which he has worked with, exert a hastening influence on alcoholic fermentation, the potassium chloride being the better of the two. He also finds that a small percentage of the salt acts more vigorously than a large one.—Richard Maly contributes two papers on the colouring matter of bile, &c.; and Liebermann and Van Dorf follow with an exhaustive paper on the cochineal colouring matters.—The next paper is by Beilstein and Kohlberg, on isomerism in the benzol series. This is the fourteenth contribution from these authors on this wide subject, the present treating on cinnamic acid and metanitrobenzoic acid.

Bulletin de l'Académie Impériale des Sciences de St. Petersburg, t. xvii., No. 1.—This number contains an important paper by Prof. Kamintzin on the employment of inorganic salts as a means for studying the development of lower organisms containing chlorophyll. He studied the action of salt solutions of specified composition and various concentration on forms of algæ, chiefly *Chlorococcus infusionum* and *Protococcus viridis*. The algæ and higher cryptogams bear a higher concentration than the phanerogams. In a 3-per-cent. solution they develop vigorously; in solutions under two per cent. zoospores were produced, these again forming zoosporangia; but where the concentration was higher the development was by division into round motionless bodies. Prof. Kamintzin also studies the development of individual varieties, owing to internal causes, the external conditions remaining the same, thus extending to the lower plant forms the class of observations made by Darwin in the animal kingdom. The plasticity of various forms of algæ under the above treatment is fully shown and illustrated.—O. Grimm describes the integumental structure of one of the Crinoidea, the *Comatula mediterranea*. Certain small canals observed in an internal fibrous layer he considers to be organs of respiration, the water entering by small openings on the external surface.—There are two short papers by Dr. Levschin on the development of osseous tissue and the structure of terminal blood-vessels in the bones of the newly-born. In a paper by Dr. Gruber, the dissection of a hand having two thumbs is described, and compared with three other cases of the same kind.

SOCIETIES AND ACADEMIES

LONDON

Royal Microscopical Society, October 2.—Dr. Hudson read a paper "On *Pedalion mira*," and exhibited specimens under the society's microscopes. This curious little animal was discovered last year by Dr. Hudson near Bristol, and a figure and short description of it is given in the *Monthly Microscopical Journal* for September 1871.—The President read a paper "On the Development of the Skull of the Crow."—Dr. Woodward sent a series of photographs for exhibition, showing the resolution of Nobert's 19th band with a Tolles lens, which was not properly corrected for chromatic errors.

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Academy of Natural Sciences of Philadelphia, February 27.—"On an Extinct Whale from California," by Prof. E. D. Cope. George Davidson, of the United States Coast Survey, recently presented the Museum of the Academy of Natural Sciences, the proximal portion of the left ramus of the mandible of a whalebone whale. The specimen was found in digging a well at San Diego, on the coast, in the southern part of the State, at a depth of seventy-four feet below the surface, July 27, 1871. The angle and condyle are broken from the specimen, and the distal extremity was not preserved. It possessed a coronoid process, the apex of which has been lost. The inner face is plane, somewhat convex above, behind the basis of the corodoid process. Anteriorly it becomes more convex, the surface turning inwards to the superior and inferior margins. The exterior face is convex, so that at the posterior foramen its diameter above the middle is greater than that below the middle. The inferior outline, from below the coronoid process to below the last external foramen, is straight, not decurved. It is obtuse most of this distance, but becomes narrowed at the anterior point. The superior margin is obtuse anteriorly, narrowed acute for ten inches anterior to the coronoid process; it is not truncate anteriorly. The internal foramina are large, and form a series below the upper margin, without distinct groove. The external foraminal series terminates much anterior to the interior, that is, the last external is opposite the sixth from behind of the inner row. There is no internal Meckelian groove. The Meckelian cavity of the ramus is large behind the coronoid, but small and in the upper part of the ramus at the last exterior foramen. The dental foramen is large, and above the base of the Meckelian cavity, so that its inner wall descends to the floor of the latter. Below the base of the coronoid the inferior part of the ramus is rounded, but narrower than at the dental foramen. The presence of coronoid process indicates that the present species was a finner, and allied to *Balænoptera*. Though there are no vertebræ or other elements to determine its reference to this genus or its ally *Eschrichtius*, it may be proper to refer it provisionally to the latter genus, since so many of its allies on the Atlantic coast formations have been found to be referable to it. This course is still more appropriate from the fact that the strata of tertiary age near San Diego are reported to be of miocene age, the same in which the eastern *Eschrichtii* have been found. As to its specific characters, these differ entirely from those of the latter. The ramus lacks the decurvature of most of them. In size, it approaches nearest the *E. polyporus*, Cope, and *E. priscus*, Leidy. It is much less convex externally than the latter. The exterior series of pores does not extend so far posteriorly as in *E. polyporus*, and the dental foramen has a superior position besides other differences. Size that of *E. priscus*. This whale, when living, probably attained a length of about forty feet.

PARIS

Academy of Sciences, September 23.—M. Faye, president.—The following gentlemen, members of the International Metric Commission, were present at the meeting, to which they were presented by the president:—Baron de Wrede, Sweden; M. Broch, Norway; M. de Jolly, Bavaria; MM. Stas and Maus, Belgium; General Ricci and M. Govi, Italy; Father Secchi, Pontifical States; M. Hirsch, Switzerland; M. Struve, Russia; Mr. Hilgard, U.S. America. General Fligelly, of the Austro-Hungarian Empire, member of the International Geodesical Committee, was also presented.—M. P. Favre read a note on the origin of the heat developed when the motion of a metallic disc is retarded by the influence of an electro-magnet. The author had stated in a paper read on the 11th September, 1871, that this heat is due to the "work furnished by the operator," and that the magnet expends no energy in producing it, the same effects being produced by permanent magnets which do not expend anything. He has repeated his experiments with apparatus of very great power, and finds all his statements confirmed.—M. Yvon Villarceau then presented the elements and ephemerides of the planet 103, Hera, by M. Leveau, which was followed by the "Results of a search into the characteristics of the elementary and quartic systems," by M. H. G. Zeuthen, presented by M. Chasles. The President then presented a note of M. A. Lallemand, on the "Polarisation and Fluorescence of the Atmosphère." The author attributes the blue colour of the atmosphere to "hypochromatic fluorescence," which he explains as fluorescence accompanied by change of refrangibility due to the partial absorption of the ultra-violet rays. The next paper was by M. E. Duvillier on "A new method of preparing Chromic Acid." The author mixes into a cream 100 parts of baric chromate, and 100 parts of water, then adds 140 parts of nitric acid of 40° Reaumur, boils for 10 minutes, filters, and allows the baric nitrate to crystallise out, after which the liquid is concentrated to about the bulk of the acid employed, which removes the last traces of baric nitrate, and the chromic acid crystallises after the expulsion of the excess of nitric acid by repeated evaporations.—MM. P. Champion and H. Pellet followed with a paper of great interest, on "The Vibratory Movements produced by Explosive Compounds." The authors, starting from an observation by Mr. Abel, that whilst a small quantity of fulminating mercury exploded in gun-cotton caused its instant violent explosion, the much more violent explosive iodide of nitrogen produced no effect, proceeded to investigate these two bodies with a chromatic scale of sensitive flames, arranged as recommended by Messrs. Tyndall and Schaffgotsch, when they found that the fulminate produced effects corresponding to the notes, la, do, mi, fa, sol. The iodide of nitrogen, however, produced no effect. When the explosives were brought as close as 3·50 metres to the flames, the iodide of nitrogen affected the upper notes, while the same weight of fulminate acted on the whole gamut. The weights used were in each case ·03 grm., and it was not till the iodide of nitrogen had been increased to ·2 grm. that it produced effects equal to the fulminate.—M. Duchartre then presented a note by M. J. Duval-Jouve, "On the diaphragms and fibro-vascular nets of the leaves and stalks of certain Monocotyledons;" which was followed by a continuation of M. Stan. Meunier's paper, "Observations on the Vein Action in Meteorites;" after which M. F. Garrigou read a paper on "The alluvial gravels of the plains of the Garonne at the village of Portet, near Toulouse."—A note of M. Bonvier, presented by M. Bouley, came next, claiming priority of discovery for M. G. B. Pelletan of the "Method of removal of liquids from the closed cavities of the body by means of aspiration," described by M. J. Guérin.—M. Hartsen sent a note relative to an alkaloid extracted from Isopyrum.—M. Dumas presented an analysis of the documents sent to the Phylloxera Commission by two of its delegates, MM. Duclaux and Maxime Cornu; and a note from M. J. Capello, of Lisbon, on the aspect of the sun about the 9th of August closed the meeting.

BOOKS RECEIVED.

English.—Elementary Geology: J. C. Ward (Trübner and Co.).—An Elementary Treatise on Geometrical Optics: W. S. Aldis (Deighton and Bell).—Elementary Treatise on Natural Philosophy: Deschanel. Part 4 (Blackie and Sons).

American.—Papers relating to the Transit of Venus in 1874, prepared under the direction of the Commission authorised by Congress. Part 1.

Foreign.—Eerste Vervolg Catalogus der Bibliotheek en Catalogus der Maleische, Javaansche en Kawi handschriften van het Bataviaasch Genootschap van Kunsten en Wetenschappen (Bruining, Batavia).—Tidschrift von Indische Taal- Land- en Volkenkunde: Stortenbeken en Michielsen, Deel xviii., Zesde Serie, Deel i., Aflevering 3 en 4; Deel xx., Zenende Serie, Deel i., Aflevering 3.—(Through Williams and Norgate.)—Der Wirbelsturme, Tornados u. Wettersäulen in der Atmosphäre: Dr. T. Reye.—Pathologische Histologie der Laftwege u. der Lunge: Dr. A. Thierfelder.

CONTENTS

Page
Houzeau on the Faculties of Man and Animals. By Alfred R. Wallace, F.Z.S. 469
Ganot's Natural Philosophy (*With Illustrations*). By Jas. Stuart 471
Our Book Shelf 472
Letters to the Editor:—
  Oceanic Circulation.—Dr. William B. Carpenter, F.R.S. . . 473
  Consciousness and Volition.—Alfred W. Bennett, F.L.S. . . 473
  Phosphorescence in Fish —Arthur Nicols 473
  On a Measuring Apparatus for Direct Vision Spectroscopes.—Henry R. Procter, F.C.S. 473
  Cat's Toes.—R. Lydekker 474
New Instrument for the Production of Ozone 474
The French Association for the Advancement of Science. By Dr. J. H. Gladstone, F.R.S. 474
The Spirit of Scientific Controversy. By Prof. W. C. Williamson, F.R.S. 475
Distribution of Heat in the Spectrum 476
Scottish Boulders 477
On the Fertilisation of a few Common Papilionaceous Flowers (*With Illustrations*). By T. H. Farrer 478
Notes 481
Siebold's New Researches in Parthenogenesis. By E. R. Lankester 483
On Instinct. By D. A. Spalding 485
On the Tree-Ferns of the Coal Measures, and their Affinities with Existing Forms. By W. Carruthers, F.R.S. . . 486
Scientific Serials 487
Societies and Academies 487
Books Received 488

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